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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,523	04/15/2004	Kazumitsu Seki	300.1154	6594

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STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
SANDVIK, BENJAMIN P	
ART UNIT	**PAPER NUMBER**
2826	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/824,523	SEKI ET AL.	
	Examiner	Art Unit	
	Ben P. Sandvik	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19 and 41-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-19 and 41-43* is/are rejected.

7)☒ Claim(s) *12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 2/20/2007 have been fully considered but they are not persuasive. Note that the rejection below has been changed to remove typographical errors and to clarify that the rejection of claim 1 is in view of Kamada. The applicant argues that "if a hydroxide is used without the Kamada process, adhesion remains bad." This argument appears to be erroneous, because the process taught by Kamada is to provide a hydroxide to a copper foil in order to improve the adhesion to that copper foil. This is explicitly stated in the Kamada reference: "it has been found that copper foil laminated plates having a very high adhesion strength can be produced by employing the process of the invention", see Col 2 Ln 56-59. A part of this process is to provide a hydroxide (-OH group) on the copper foil, see Col 2 Ln 66 and the –OH group in Figures 1 and 2. The applicant further argues that Kamada requires the use of "oxygen free copper." Although Kamada does indeed use this phrase, it is then defined to include copper having an oxygen content of not more than 50 ppm (Col 2 Ln 45-47). Hence, the rejection of claim 1 in view of Horita and Kamada is maintained.

Furthermore, the applicant requests that the examiner address the traversal of the rejection of claims 6 and 7 in view of the Nagai reference that is included in pages 8-9 of the prior response. However, the traversal is on the grounds that the Nagai reference does not overcome the deficiencies of Horita and Adler rejection. Since Adler is no longer being used in the rejection this traversal is rendered moot.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8-11, 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horita et al (U.S. Patent #6034422), in view of Kamada (U.S. Patent #4518449)

With respect to **claim 1**, Horita teaches a conductor substrate for mounting a semiconductor element (Fig. 5d, 120), at least a portion thereof mounting said semiconductor element being sealed with an insulating resin (Fig. 5d, 190), wherein an uppermost surface layer of said conductor substrate comprises copper or an alloy thereof (Col 7 Ln 60-62), and said conductor substrate is partly or entirely covered with a layer of copper oxide (Fig. 5d, 130A and Col 11 Ln 47); but does not teach that the copper oxide contains a hydroxide formed upon surface treatment of said conductor substrate. Kamada teaches a copper oxide layer containing a hydroxide formed upon surface treatment of a conductor substrate (Col 2 Ln 7-27, --OH group). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a copper oxide layer containing a hydroxide on the surface of the leadframe of Horita based on the teachings of Kamada in order to improve the adhesion to the copper layer.

With respect to **claim 2**, Horita teaches that said conductor substrate substantially comprises copper or an alloy thereof (Col 7 Ln 60-62).

With respect to **claim 3**, Horita teaches a conductor substrate substantially comprising copper or an alloy thereof (Col 2 Ln 23-27).

With respect to **claim 8**, Horita teaches that said conductor substrate is a lead frame (Abstract).

With respect to **claim 9**, Horita teaches that said oxide layer is covering at least a portion of the surface of said conductor substrate except for wire- drawing portions (Fig. 5, 140).

With respect to **claim 10**, Horita teaches that said oxide layer is covering the whole surface of said conductor substrate (Fig. 7, 130a).

With respect to **claim 11**, Horita teaches that said conductor substrate is a heat-dissipating plate (copper is a thermally conductive material).

With respect to **claim 13**, Horita teaches an oxide layer having a thickness in the range of 0.02 to 0.2 micrometers (Col 4 Ln 6-10).

With respect to **claim 14**, Horita teaches that no segregated layer is formed between said conductor substrate and said layer of hydroxide-containing copper oxide when treated under a high-temperature condition (Fig. 6c, 130a).

With respect to **claim 15**, Horita teaches a copper oxide layer that is not larger than 0.5 micrometers (Col 4 Ln 6-10), but does not teach that the oxide comprises needle-like crystals. Adler teaches an oxide layer having needle-like crystals (Col 1 Ln 18-19). It would have been obvious to one of ordinary skill in

the art at the time the invention was made to provide needle-like crystals in the oxide layer of Horita as taught by Adler in order to improve the adhesion of the layer.

W ith respect to **claim 16**, Horita teaches that at least one semiconductor element (Fig. 5, 160) is mounted on a predetermined position of a conductor substrate described in claim 1, and said conductor substrate is sealed with an insulating resin (Fig. 5, 190).

With respect to **claim 17**, Horita teaches that said semiconductor substrate is substantially entirely sealed with said insulating resin (Fig. 5, 190).

With respect to **claim 18**, Horita teaches that the semiconductor device is mounted on a substrate on a mounting substrate using a solder (Fig. 5, 170 and Col 11 Ln 24).

With respect to **claim 19**, Horita teaches that the solder is a lead-free solder (Col 11 Ln 24).

Initially, and with respect to **claims 4, 5, and 14**, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per

se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear.

As to the grounds of rejection under section 103, see MPEP § 2113

With respect to **claims 41 and 43**, Horita teaches a substrate having a surface including a mounting portion to receive and mount thereon a semiconductor element (Fig. 5d, 120); and an outermost layer of copper oxide substantially covering the substrate surface (Fig. 5d, 130A and Col 11 Ln 47); but does not teach that the copper oxide contains a hydroxide formed upon surface treatment of said conductor substrate. Kamada teaches a copper oxide layer containing a hydroxide formed upon surface treatment of a conductor substrate (Col 2 Ln 7-27, --OH group). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a copper oxide layer containing a hydroxide on the surface of the leadframe of Horita based on the teachings of Kamada in order to improve the adhesion to the copper layer.

With respect to **claim 42**, Horita teaches an insulating resin covering substantially all of the substrate and the semiconductor element (Fig. 5d, 190).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horita and Kamada, in view of Nagai et al (U.S. Patent #2003/0044597).

With respect to **claims 6 and 7**, Horita does not teach that said insulating resin is a resin comprising a hydroxyl group in the molecule thereof, and a hydrogen bonding force is generated between said hydroxyl group-containing resin and said layer of hydroxide-containing copper oxide. Nagai teaches an epoxy resin containing a hydroxyl group, wherein there is a hydrogen bonding force between the resin and a copper oxide (Paragraph 23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an epoxy resin in the device of Horita as taught by Nagai in order to improve the adherence between the lead frame and resin.

Allowable Subject Matter

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben P. Sandvik whose telephone number is (571) 272-8446. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EVAN PERT
PRIMARY EXAMINER